

TRANSMITTAL SLIP		DATE	
TO:			
ROOM NO.		BUILDING	
REMARKS: <i>Corrected pages for AIA Report no. 222.</i> <div data-bbox="358 1194 609 1455" style="border: 1px solid black; width: 154px; height: 124px; display: inline-block; vertical-align: middle;"></div> <i>Components</i> 25X1			
FROM:			
ROOM NO.	BUILDING		EXTENSION

1. INTRODUCTION

The purpose of this report is to describe the electrical and mechanical features of a 3 - 30 mc 3 watt transmitter and a 3 - 30 mc superheterodyne receiver developed, during the course of a radio circuit study, by [REDACTED]

[REDACTED] The radio circuit study included circuit applications of new components, evaluation of the capabilities and limitations of new solid state devices, and development of appropriate transistor circuitry.

The transmitter and receiver when presented to the R&D Laboratory for evaluation, were found to be electrically and mechanically defective. A listing of the major electronic components of the units and the results of cursory tests conducted on these units are summarized in this report.

Although the major purpose of this evaluation was to evaluate new components which were used in the transmitter and receiver, mechanical and electrical defects of the equipment are outlined to explain why the evaluation of certain components was limited.

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DOCUMENT NO. 1
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2. MECHANICAL AND ELECTRICAL TEST RESULTS

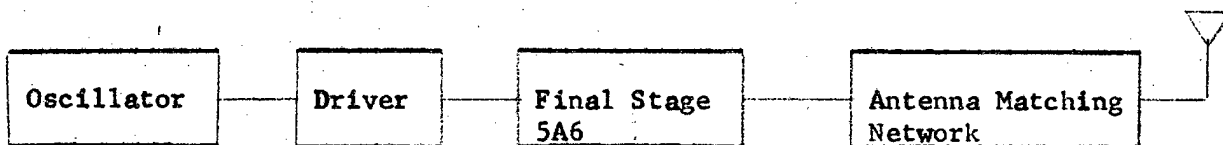
2.1. 3 - 30 MC Transmitter

2.1.1. Size and Weight

Size: 6 5/16" x 3 9/16" x 2 5/8"

Weight: 2 lbs., 10 ozs.

2.1.2. Transmitter Block Diagram



2.1.3. Components

2.1.3.1. Active Devices

All of the stages, with the exception of the final output stage, utilize transistors. Transistors were chosen to aid in miniaturization and to reduce the over-all power consumption of the transmitter. A 5A6 tube is used in the output stage since suitable power transistors were not available at the time the transmitter was constructed.

2.1.3.2. Barium Titanate Capacitor

The barium titanate capacitor, incorporated into the antenna network, gives a large change in capacitance for its physical size. The capacitance range has been previously measured to be 30 to 1800 uuf. This capacitor is unique and it is felt that with improvement it will definitely advance the state of the art. The capacitor, in its present form, however, is unreliable and physically large enough to pose serious problems in miniaturization of units in which it is used. The capacitance now varies from 30 uuf to a maximum value of 335 uuf. Inspection revealed that the dielectric around one of the stationary plates was cracked.

2.1.3.3. 6 Gang Tuning Capacitor

The 6 gang tuning capacitor employs polyethelene as a dielectric medium. The 6 sections are mounted on a common shaft, thus are tuned with one control knob. Trimmer capacitors are mounted on the 6 gang tuning capacitor.

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2.1.4. Continued

Antenna Load 77 Ohms - V Input 12 Volts DC

Freq. (MC)	Input (DC) (Amperes)	Power Input (Watts)	Oscillator (Voltage)	5A6 Grid (Voltage)	5A6 Plate (Voltage)	RF Current (MA)	RF Power (Watts)
3	0.96	11.52	0.07	2.4	172	128	1.262
4	1.08	12.96	0.10	3.0	183	160	1.97
5	0.25	3.0	0.12	0.8	195	27	0.0562
6	0.57	6.84	0.08	1.8	190	65	0.326
7	0.80	9.60	0.08	2.0	190	110	0.931
8	0.82	9.84	0.08	2.2	188	132	1.34
9	0.82	9.84	0.09	2.1	188	125	1.20
12	0.35	4.20	0.10	0.9	192	24	0.0444
13	0.88	10.56	0.05	1.0	192	30	0.0694
15	0.94	11.28	0.05	1.0	188	48	0.177
20	0.90	10.80	0.06	1.4	183	125	1.2
24	0.90	10.80	0.05	1.3	183	118	1.07
30	0.90	10.80	0.04	1.4	183	113	0.98

2.15. Mechanical Defects

The transmitter is a very rough engineering model. The following defects were noted:

- (1) When the transmitter is reassembled extreme care must be exercised to align the shafts in the holes in which the knobs are recessed. Failure to do this allows the knobs to bind against the case. In addition, care must be used to align the 5A6 tube socket with respect to its guide.
- (2) The ferrite coils are unsupported in the case and move about under the influence of mechanical shock or relatively strong magnetic fields.
- (3) The transmitter controls are unmarked as to function or range.
- (4) The coil wiper arm is spring loaded. When attaching the associated knob it is necessary to insure that the shaft is all the way up. If this is not done the wiper arm rotation will be restricted to 180°. To position the shaft properly it is necessary to partially disassemble the transmitter.

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3. CONCLUSIONS

The transmitter and receiver use unique components to some degree. Although in some cases not fully reliable, these components provide a greater freedom of choice to the designer and increase the number of ways in which a given circuit may be designed. In some cases this will allow improved and/or more reliable circuits to be designed.

The conclusions reached concerning the practical use of the transmitter, receiver, and of the special components incorporated in the devices are based on a cursory examination of each device or component. Specific technical information concerning the operation of each device or component may be obtained by requiring the manufacturer to build the devices on breadboard layouts so as to permit access to all special components.

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